IN THE CIRCUIT COURT OF
THE 11TH JUDICIAL CIRCUIT
IN AND FOR DADE COUNTY, FLORIDA

GENERAL JURISDICTION DIVISION

CASE NO. 94-08273 CA (22)

HOWARD A. ENGLE, M.D.,
et al.,

Plaintiffs,

vs.

R.J. REYNOLDS TOBACCO
COMPANY, et al.,

Defendants.
_____/

Miami-Dade County Courthouse
Miami, Florida,
Wednesday, 9:30 a.m.
March 17, 1999

TRIAL - VOLUME 254

The above-styled cause came on for trial before the Honorable Robert Paul Kaye, Circuit Judge, pursuant to notice.

APPEARANCES:

STANLEY M. ROSENBLATT, ESQ.
SUSAN ROSENBLATT, ESQ.
On behalf of Plaintiffs

DECHERT PRICE & RHOADS
ROBERT C. HEIM, ESQ.
SEAN P. WAJERT, ESQ.
On behalf of Defendant Philip Morris

COLL DAVIDSON CARTER SMITH SALTER & BARKETT
NORMAN A. COLL, ESQ.
On behalf of Defendant Philip Morris

ZACK KOSNITZKY
STEPHEN N. ZACK, ESQ.
On behalf of Defendant Philip Morris

CARLTON FIELDS WARD EMMANUEL SMITH & CUTLER
R. BENJAMINE REID, ESQ.
On behalf of Defendant R.J. Reynolds

JONES, DAY, REAVIS & POGUE
RICHARD M. KIRBY, ESQ.
On behalf of Defendant R.J. Reynolds

KING & SPALDING
MICHAEL RUSS, ESQ.
RICHARD A. SCHNEIDER, ESQ.
On behalf of Defendant Brown & Williamson

CLARKE SILVERGLATE WILLIAMS & MONTGOMERY
KELLY ANNE LUTHER, ESQ.
On behalf of Defendants Liggett Group
and Brooke Group

SHOOK HARDY & BACON
EDWARD A. MOSS, ESQ.
WILLIAM P. GERAGHTY, ESQ.
On behalf of Defendant Brown & Williamson
JAMES T. NEWSOM, ESQ.
On behalf of Defendant Lorillard

DEBEVOISE & PLIMPTON
ANNE COHEN, ESQ.
JOSEPH R. MOODHE, ESQ.
On behalf of Defendant The Council for Tobacco Research

(APPEARANCES - Continued)

GREENBERG TRAURIG HOFFMAN LIPOFF ROSEN & QUENTEL
DAVID L. ROSS, ESQ.
On behalf of Defendant Lorillard

MARTINEZ & GUTIERREZ
JOSE MARTINEZ, ESQ.
On behalf of Defendant Dosal Tobacco Corp.
and Tobacco Institute

KASOWITZ BENSON TORRES & FRIEDMAN
AARON MARKS, ESQ.
NANCY STRAUB, ESQ.
On behalf of Defendants Liggett Group
and Brooke Group

HUNTON & WILLIAMS
R. NOEL CLINARD, ESQ.
On behalf of Philip Morris.

I N D E X

E X H I B I T S

PLAINTIFFS' EXHIBITS	OFFERED PAGE	ADMITTED PAGE	FOR ID PAGE
NONE			

E X H I B I T S

DEFENDANTS' EXHIBITS	OFFERED PAGE	ADMITTED PAGE	FOR ID PAGE
NONE			

(Whereupon, the following proceedings were had:)

THE COURT: Good morning. What misfortune befalls me today?

MR. HEIM: A good way to start it.

MS. LUTHER: There is optimism for you.

MR. HEIM: With that question, Mr. Moss has something to say.

MR. MOSS: Let us not disappoint you.

THE COURT: It figures.

MR. MOSS: Judge, we have some issues we want to discuss with you a little later regarding the end of the day yesterday and the JAMA article. But we don't want to delay Dr. Spears. Perhaps at an appropriate time, before or after lunch --

THE COURT: Yes, that's a good time.

MR. MOSS: -- we'll take that up, if that's all right with you?

THE COURT: That's fine. I don't want to waste the jury.

MR. MOSS: I simply wanted to preserve the record. We would do it now, but we're trying to move it along, if that's all right with Your Honor?

THE COURT: No problem.

Okay. Other than that, we're ready?

MR. ROSS: Ready.

THE COURT: Dr. Spears is here?
MR. ROSS: He's here, Your Honor.
THE COURT: There you are.
All right. Bring the jury out, please.
MR. HEIM: Your Honor, have both sides given you the paper now that you wanted?
THE COURT: No. I didn't get theirs.
MR. ROSENBLATT: You'll have it.
(The jury entered the courtroom.)
THE COURT: All right. Good morning, folks.
JURY PANEL: Good morning.
THE COURT: How is everybody today?
JURY PANEL: Fine. Fine.
THE COURT: Have a seat, folks.
Over the night, anybody read, see, hear, been exposed to or in any way come in contact with any information regarding this case or any other case involving tobacco or of the allied fields?
JURY PANEL: (Negative response.)
THE COURT: Okay. Our computer is down, which means that -- mine isn't. Is yours?
THE REPORTER: Just started.
THE COURT: We can get started. They're going to put this out on a need-to-know basis, and I don't need to know.

Okay. That's the reason I don't fly the shuttle. The thing doesn't work.

Okay. If we can call our next witness, please.

MR. HEIM: Yes, sir.

MR. ROSS: Call Dr. Alex Spears.

THE COURT: Dr. Spears, please.

Thereupon:

ALEX SPEARS, PH.D.

having been called as a witness, was duly sworn, examined, and testified as follows:

MR. ROSS: All right?

THE COURT: Yes, sir.

MR. ROSS: May it please the Court.

DIRECT EXAMINATION

BY MR. ROSS:

Q. State your name.

A. Alexander White Spears, III.

Q. And where do you reside?

A. [DELETED]

Q. Where are you employed?

A. By Lorillard Tobacco Company.

Q. What's your position with Lorillard Tobacco Company?

A. I'm chairman of the board.

Q. And have you also been at times chief executive officer at Lorillard Tobacco Company?

A. Yes, I have.

Q. All right. Would you briefly describe for the jury your duties and responsibilities when you were the CEO of Lorillard Tobacco Company?

A. Yes. I had responsibility for the overall operations of the company, and that includes such operations as our field sales, our marketing activity, manufacturing and associated activities there, such as quality control, human resources, engineering.

I also had research and development reporting to me, our legal -- legal affairs area, and our financial area.

Q. Now, Dr. Spears, you have already given testimony before this jury in the form of a videotaped deposition of yours that has been played to the jury, so we're not going to talk about any number of things that were already talked about in your videotaped deposition, but I do want to begin by just expanding a little bit about what you said there about your background with the company.

How long have you been with Lorillard?

A. Since 1959.

Q. And when you first joined Lorillard, what was your position with the company?

A. I was research associate in the laboratory.

Q. All right. Were you a chemist?

A. Yes. By education, I'm a chemist.

Q. All right. What is the educational background that led you to your position at Lorillard?

A. I have a Bachelor's degree in chemistry from Allegheny College, and a Ph.D in chemistry from the State University of New York at Buffalo.

Q. Okay. And what is your Ph.D in?

A. Physical organic chemistry.

Q. Tell the jury what physical organic chemistry is.

A. Organic chemistry is chemistry dealing with the chemistry of those compounds that are related to living organisms or living things at one time or another, usually consisting of the elements carbon, hydrogen, oxygen, nitrogen and occasionally sulfur, and the physical aspect of the area, physical organic chemistry, relates to the study of mechanisms of these reactions, rates or reactions, things like that.

Q. All right. And because of your Ph.D in chemistry, it is appropriate, is it not, to call you Dr. Spears?

A. If you -- if you choose, yes.

Q. Dr. Spears, did you begin work on your doctorate immediately after getting your Bachelor's degree, or is there anything in between there?

A. No. I spent two years in the military, in the Army Medical Corps. I was associated with an evacuation hospital and worked in the laboratory for most of that time.

Q. Okay. Have you ever worked in private industry for any company other than Lorillard?

A. Just during my graduate work, I did work part time for a company in Buffalo, New York.

Q. All right. How about teaching, have you ever taught chemistry?

A. Yes. I've taught chemistry at Millard Fillmore College in Buffalo, and I also taught four years of chemistry, four different levels of chemistry at Guilford College in Greensboro, North Carolina.

Q. Have you always been at Lorillard in Greensboro, North Carolina?

A. Yes, I have.

Q. I'd like to talk a little bit with you about the company, about Lorillard.

24 First of all, is the company headquartered in
25 Greensboro, North Carolina?

1 A. Yes, it is.
2 Q. How old is Lorillard?
3 A. Lorillard was founded in 1760, so it's about
4 240 years old.
5 Q. So that was actually before the Revolutionary
6 War, Lorillard was formed?
7 A. That's correct.
8 Q. How many people does Lorillard employ today?
9 A. About 3,500 people.
10 Q. In terms of the market for cigarette sales in
11 the United States, where does Lorillard fit among the
12 cigarette manufacturers?
13 A. Lorillard would be fourth in terms of market
14 share, domestic market share.
15 Q. What is the market share of Lorillard?
16 A. Lorillard's market share in 1998 was about
17 9.4 percent of the market.
18 Q. And who are the cigarette manufacturers, your
19 competitors, that rank ahead of Lorillard in terms of
20 that?

A. Philip Morris is first, with about 50 percent market share in '98; Reynolds second, with about a 25 percent market share; and B&W third, with about a 15 percent market share.

Q. What are the cigarette brands that Lorillard

manufacturers and sells?

A. The largest brand is Newport. Other brands are Kent, True, Maverick. We have Old Gold, and some minor brands, Triumph, Max and Satin.

Q. Does Lorillard manufacture all of its cigarettes in Greensboro?

A. Yes, we do. We manufacture only in Greensboro.

Q. You have no manufacturing facilities anywhere else?

A. No. Only a storage facility in Danville, Virginia.

Q. In addition to the manufacturing plant, what other facilities does Lorillard have in Greensboro, North Carolina?

A. Well, our headquarters is at a separate location than the operations center, on two different sides of the city.

The operations center consists of

manufacturing, research and development and generally those things associated with manufacturing, such as engineering, quality control. Some of our information systems functions there.

And then in our headquarters building is our marketing, sales, executives, finance, legal affairs,

marketing research and our central information systems, that group.

Q. Dr. Spears, during the 40 years of your professional employment with Lorillard in Greensboro, North Carolina, have you also been active in the Greensboro community?

A. Yes, I have.

Q. Just give the jury a couple of brief examples of your activities in the community.

MR. ROSENBLATT: I'm going to object to this, Your Honor.

THE COURT: Active in his community?

MR. ROSS: Yes, Your Honor. Background.

THE COURT: Yes. Overruled. Very briefly. I don't want to go into any great detail.

MR. ROSS: Yes.

THE WITNESS: All right.

A. I'm a trustee at two of the local -- one college and one university, North Carolina A & T University and Guilford College. I've run a multitude of fund-raising campaigns for various organizations in the city. Currently I'm heading the United Way Campaign for the Greater Greensboro Area.

I have chaired the United Negro College Campaign for Bennett College there. I've run campaigns

for the university, the YMCA, which I also chaired. That sort of thing.

BY MR. ROSS:

Q. Now, we know that you're presently chairman of the board of Lorillard and that you started at Lorillard as a research associate.

Briefly outline for the jury the various positions you've held in your career with Lorillard, starting in the beginning and up to the time you became chairman.

A. Well, as I said, I started as research associate, and that was 1959. Early 1960s I was promoted to senior research chemist. Mid-'60s, 1965, director of basic research. And as I recall, 1967, director of research and development, and then vice

president for research and development in the early 1970s.

A little later in the '70s, I was promoted to senior vice president for research and operations, which brought in the manufacturing operations under my responsibility.

I then became executive vice president over the same -- same areas, and then vice chairman, which occurred in the -- I guess the early 1990s, end of 1980s, and that included an effort to look -- look into

international as a marketing effort.

And then in 1995 I became chairman and CEO.

Q. All right. Dr. Spears, based upon this history that you've given us with Lorillard and various positions you've held starting at the bottom and moving to the top, are you familiar with the research and development activities that Lorillard has carried out, either in its own laboratories, or through outside researchers that it has supported on cigarette and tobacco smoke since the 1950s?

A. Yes.

Q. Okay. And is that true even for the years that you've been CEO?

A. I'm sorry?

Q. Is that true even for the years that you were in upper management and CEO?

A. Yes. Research continued to report to me, and I remained familiar with their activities.

Q. And how have you stayed informed about the activities of research and development areas since you left the laboratory as a working chemist?

A. Well, as I said, the vice president for research has reported to me since I left the laboratory area. But I have continued to participate in the research discussions, participated in having

presentations and discussions of various research projects over time and, of course, reviewing reports that came out of research.

Q. And when you were working as a chemist at Lorillard, actively in the laboratory, did you maintain a knowledge of the scientific literature that was out in the public domain bearing on issues of smoking and health and tobacco chemistry and all that sort of thing?

A. Yes. That was part of my responsibility.

Q. And have you continued to stay abreast of

scientific developments in those areas, even since your days in the laboratory?

A. I have.

Q. And how do you do that?

A. Well, principally through reading some of the scientific journals, but there are many abstracting services that provide summaries of articles that are published, and I review the abstracts for papers that are relative to the subject, and where I think it's a paper that's worth reading, I will read the paper.

But the review services are such things -- there was one called Tobacco Abstracts. There's another, Current Contents, which abstracts the medical literature in general, journals that are published by

the American Chemical Society.

Q. Dr. Spears, when you began with Lorillard, did you also take it upon yourself to become educated about the research and development activities that Lorillard had engaged in even prior to your employment?

A. Yes, I did.

Q. How and why did you do that?

A. Well, some of the people that I was working with, of course, were with the company prior to the

time that I joined, and I discussed their projects with them and got some background in that manner.

I also reviewed reports that had been written by them and earlier workers that were in our files.

Q. Dr. Spears, I want to talk to you about Lorillard's research and development over the years, and let me first begin by asking you this. What have been the objectives of Lorillard's research and development programs over the past 50 years?

A. Well, there have been multiple objectives. I'd say number one was to provide the information and develop the products that we felt would be competitive with our competitors in the marketplace. That was one objective.

Another objective was to improve our processes so that we could produce the finest quality

products in the marketplace. And that's physical quality that I'm speaking of. And also to do research into the field of tobacco and health in all aspects of it that we thought we might improve our products in that respect.

Q. Dr. Spears, in order to just visually assist

the jury and me in going through some of the programs that Lorillard has engaged in over those 50 years, have you helped me prepare a demonstrative exhibit which lists some of the programs that Lorillard has engaged in?

A. I have.

MR. ROSS: I'll put this up here.

Q. All right. Can you see that all right, Dr. Spears?

A. Yes, I can.

MR. ROSS: Okay. Everybody over here see that all right?

JURY PANEL: (Affirmative response.)

BY MR. ROSS:

Q. Dr. Spears, is this the exhibit that you helped us prepare in this regard?

A. Yes, it is.

Q. All right. I want to go through these areas with you and talk to you about what they're about and

what was accomplished.

And the first item on the board up here says: Early Smoke Chemistry Research. Now, tell us, first, what is smoke chemistry research?

A. At that time, it was principally an effort to

identify some of the components of tobacco smoke, in order to get an understanding of what it was and what its composition was.

Q. When did Lorillard begin research into the chemistry of tobacco smoke?

A. I believe Lorillard established a laboratory in the 1950s, but I think some of the earliest work on chemical research, chemical composition of smoke was in the 1940s.

Q. Okay. Now, has Lorillard carried out this smoke chemistry research at its own laboratories in Greensboro?

A. Yes, it has.

Q. And have Lorillard scientists and researchers published articles in scientific journals and made scientific presentations about the smoke chemistry research they've carried out?

A. They have.

Q. In addition to the work that Lorillard has done in this field, in its own laboratories, has

Lorillard also supported outside scientists, like university researchers, in the field of smoke chemistry research?

A. That's correct.

Q. Can you give us some examples of outside scientists that Lorillard has supported in smoke chemistry?

A. Yes. In the -- in the 1940s, there was a research program at Ohio University, which was aimed at identifying components of tobacco smoke. The Armor Research Foundation was also an outside entity that started in the 1950s, the relationship between that organization and Lorillard.

And, again, the tasks assigned were identification of components of tobacco smoke.

Q. What, in general, has been the result of both these inhouse and outside research efforts into smoke chemistry?

A. Well, I think there are a number of results, but generally identification, isolation and identification of the individual components of tobacco smoke. And, secondly, looking for components that may be responsible for some of the responses in the bioassay systems that were used.

Q. Okay. What's that, just so the jury

remembers? They've heard this before, but what's a

bioassay system?

A. A bioassay is any animal or part of an animal or cell that is used in some way to compare different agents or different products with respect to a response in that bioassay system.

Q. Was the work sponsored at Ohio University and the other institutions that you mentioned sponsored by Lorillard, was all of that work on smoke chemistry research also published?

A. Yes, it was. That was published where it was original work and worthy of publication.

Q. Now, since this work began in the 1940s, have there been advances made in smoke chemistry research?

A. Dramatic advances.

Q. All right. In the '40s and even into the '50s, Dr. Spears, was it possible, with the chemical analytical techniques available to chemists such as yourself, to be able to identify all of the components of tobacco smoke?

A. No. Only the major components of tobacco smoke were identified in those periods of time; and the methods of separation of components and methods of identification were very rudimentary compared to today, and really only able to identify the major components.

Q. And is this advance in analytical chemistry, is that anything unique to smoke chemistry research, or is that just true of chemistry research?

A. True of chemistry in general and analytical chemistry, in particular.

Q. Dr. Spears, what was the underlying purpose, again, of smoke chemistry research and the attempt to identify these components?

A. Well, the one purpose, as I indicated, was to understand the product, in terms of what is -- what is the product, in terms of chemical composition, and also some of it was aimed at bioassays that existed at that time, or were being developed at that time, with respect to responses with application of tobacco smoke.

Q. Dr. Spears, let's talk about the second item up here on the board, which says: Selective Reduction Research. And, again, the jury has heard testimony about some of these concepts, so I don't want to go into it in great detail, but just remind us what is selective reduction research in the area of tobacco.

A. I would define it as a reduction, a specific reduction of compounds in tobacco smoke, or a selective

reduction, if you will, where you are reducing specific compounds but not others. You're changing the composition of tobacco smoke in a selective way.

Q. Okay. We'll come back to the next item. Let's focus right now on the selective reduction research.

When did Lorillard begin its work on selective reduction research?

A. It began in the 1950s, and some of the Armour Research Program was aimed at that selective reduction.

Q. What techniques has Lorillard explored in the selective reduction research program?

A. There are three -- three techniques. One would be to modify tobacco in a way that you selectively modify the composition of smoke, the results; and this might be through genetic modification, for example, of tobacco or by removal of certain components in tobacco through solvent extraction, are some of the methods that were employed.

Another route to selective reduction would be to change the combustion or pyrolysis product -- process, which occurs during the smoking, and to

modify

it in such a way that you selectively alter the compounds that appear in tobacco smoke. And a third route, which we discovered in the early 1960s, was through selective filtration, particularly for compounds that previously were not thought to be capable of selective filtration.

Q. Okay. Has the research into selective reduction techniques been successful overall for Lorillard?

A. Yes, it has.

Q. Give the jury some examples of what you have been successful selectively reducing in the cigarettes that you actually manufacture and sell.

A. Well, in the early 1960s, we discovered that we could selectively remove a class of compounds called phenols.

Q. How do you spell that, for the court reporter?

A. P-H-E-N-O-L-S.

Q. Okay. Thanks. Go ahead.

A. And we developed filters that would selectively remove the -- these compounds, and published the work and patented the work and applied

it

commercially and manufactured our products under those patents for a number of years until I think some of the filter suppliers began to develop alternatives to this, and since that time we've been using the alternatives.

Q. Okay. Are you still selectively reducing phenols?

A. Yes.

Q. Just using a different technique today?

A. Yes, we are.

Q. Now, let's talk about the third item.

What is general reduction research? What does that refer to?

A. General reduction refers to what's called tar, in general, or the particulate phase or the aerosol components, that is, the little droplets that you see in smoke. Generally reducing them but not altering the composition of that material, but just reducing it by some amount.

Q. Okay. And when did Lorillard, again, begin its work on general reduction techniques?

A. General reduction, through filtration, occurred in the early 1950s. I think there was some work prior to that involving selection of tobaccos

that

might yield general reduction in tar.

Q. Okay. Have general reduction techniques that Lorillard has worked on proved more successful, generally, than selective reduction?

A. Well, I think they're two different things, but, yes, there has been a rather major general reduction on a sales-weighted basis of cigarettes in general over time.

Q. Okay. Is tar a component of cigarette smoke?

A. Tar is not -- I guess you could call it a

component, but what it really is is the aerosol phase of tobacco smoke; and it's defined simply by a method of collecting it, which is to pass it through a specific filter that collects all of the aerosol particles in smoking the cigarettes with a machine that passes through this filter, is called the vapor phase or gas phase, that which is collected is called the particulate phase, and then after analysis for water and nicotine and subtraction thereof, of these two elements, the remaining material is called tar.

Q. Okay. Now, you mentioned a few moments ago that there had been a major reduction of tar. On a sales-weighted average basis, how much has tar been

reduced in present-day cigarettes, compared to those produced and sold in the '50s?

A. That's been estimated to be about 65 percent.

Q. Okay. That's generally true of Lorillard's products, as well?

A. Well, Lorillard's products are in -- I think typical of other competitive products, in terms of a range of tar deliveries, so, yes, I think that Lorillard has certainly achieved major reductions and introduced products with major reductions.

Q. Okay. And what is the reason that Lorillard has worked to accomplish this reduction in tar?

A. Well, we worked -- for a number of reasons. One, we believed there was a market for cigarettes with reduced tar, so we were trying to fill a need in the marketplace, a feeling that we could sell products in the marketplace with these properties.

Secondarily, with respect to a reduction of tar, it was being indicated by many of the investigators, health-related investigators, that tar was the undesirable fraction in tobacco smoke from some of the bioassay system work, and the general reduction would have been responsive to trying to reduce the

activity on mouse skin, for example, which was used as one of the bioassays, the general reduction related to that, and responsive to reducing that kind of activity in tobacco smoke.

Q. Let's move on to the next item.

What is ciliastasis research? What is ciliastasis, first of all?

A. Well, ciliastasis relates to cells that line the upper respiratory tract of the human being, and they're also found throughout the animal world in various locations of the animals. But in the human being, they have the function of propelling mucous up from the lower respiratory tract and removing any inhaled particles that are laying on that mucous. In

other words, it's a defense mechanism of the lung that's called the mucous escalator, and the cilia are the cells that propel that mucous.

I guess I should add, if they stop, you would call it ciliastasis.

Q. What is a ciliastasis agent?

A. A ciliastatic agent is any agent that reduces or causes the cilia to stop --

Q. Okay.

A. -- functioning.

Q. All right. Would you, again, just briefly outline for the jury what research Lorillard has engaged in over the years in the field of ciliastasis?

A. Yes. Again, in the 1960s, there were some suggestions that tobacco smoke could be interfering with the mucous escalator, the cilia transported the mucous, and there were bioassays developed to try to model its behavior in the laboratory. And Lorillard was active in developing those bioassays at that time; and we developed a number, both in our own laboratories, and with some consultants that we employed at the time, and we carried out research as to what -- how we can modify the response to cigarette smoke in these bioassay systems.

Q. Okay. Again, these bioassays or these

biological testing, would that be another --

A. That's fine.

Q. -- word for it?

This biological testing on ciliastasis that Lorillard was conducting, did you conduct it at your own laboratories in Greensboro?

A. Much of it, yes.

Q. Was there also some work conducted, again, by outside researchers that Lorillard supported?

A. That's correct.

Q. And were you personally involved in this ciliastasis work, Dr. Spears?

A. Yes. I was very active in it.

Q. Okay. And who were the outside researchers that you supported in this regard?

A. There were two: a Professor Dalhamn, at the Karolynski Institute in Sweden, was recognized as kind of a world authority in this area, with respect to ciliastasis and lung defense mechanisms; and also his co-worker, Ragner Rylander, were the two we engaged at the time.

Q. Was the research that was done either at the Lorillard lab in Greensboro or that Dr. Dalhamn and Dr. Rylander did, with your assistance, was that all published in scientific journals and available to the

scientific community?

A. Yes. The work has all been published.

Q. Did the research result in any mechanism to reduce ciliastasis?

A. Well, there were a number of things that came

out of this work. One, we discovered a compound that in our bioassay systems was a prophylactic, at least in some of the assay systems, and these were bioassays involving the intact animals. The animals used were cats and rabbits, particularly, and Guinea pigs, and we developed that compound that we found to be a prophylactic in preventing ciliastasis as part of that research.

And then, secondarily, we found ultimately that the oral cavity of man was very effective in removing the ciliastatic components of tobacco smoke. Also we could remove them with activated carbon filters, or greatly reduce it.

We also studied the phenols, which we found had some activity in the ciliastasis area, and also the filters that we had developed for selective removal of phenols.

Q. About how long did Lorillard carry on the research?

A. This research started in the early 1960s and

continued through, I'd say, about 1977 or '8.

Q. And what was the ultimate conclusion of the

research that Lorillard did with ciliastasis?

A. Well, in terms of the prophylactic compounds, we pursued that through a very long-term chronic inhalation study in dogs, and it did not show up as reducing the pathology of the lung in those dogs. So we abandoned that.

And, secondarily, we found, as I indicated, that the oral cavity of man removes these agents very selectively and very effectively, and that our conclusion is that ciliastasis is not a major issue with respect to tobacco smoke.

Q. Now just, again, so the jury understands the phrase that you've used a couple of times, "oral cavity," what's that oral cavity?

A. The mouth, if you will.

Q. All right. Dr. Spears, let's now go to the next topic. We put up here cooperative research with government and health scientists.

First, I'd like to ask you, generally, for some examples of cooperative research with either the government or outside health scientists that Lorillard has been involved in over the years.

A. All right. One activity which occurred in

the 1950s, early 1950s, middle 1950s, I guess, were

with two researchers, Drs. Wynder and Hoffman, and they had published work indicating that tobacco smoke was active in producing tumors in the mouse skin painting model.

And Lorillard cooperated with them over quite a few years from that point into the future in providing -- providing those researchers with materials for studies in their lab, preparing cigarettes and tobacco smoke condensate to be used in the various experiments that they reported, generally that kind of assistance to that lab, and also in comparing analytical methods that we were developing for measuring some of the tobacco smoke components at that time, to determine whether or not the two laboratories were getting the same kind of results, so we shared that information with those coworkers. That's one example.

Another example is, in the period of 1968 to 1977, there was an activity within the government, particularly the National Cancer Institute, which is generally referred to as the Tobacco Working Group. I was a member of that Tobacco Working Group for that entire period and participated actively in advice in my fields of expertise to the NCI staff who ran the

program, a program of which was to develop a less hazardous cigarette as the starting point for that activity.

We also cooperated in preparing many of the samples of cigarettes that were used in those studies with the government; provided our expertise in terms of analytical methods and measurement -- means of measuring components of tobacco smoke, to one of the laboratories that was set up by the government to make these measurements on the experimental products that were being studied, so a very large cooperative effort with the government under that activity.

Q. All right. I want to talk with you in a little bit more detail about these activities you just mentioned.

Let's start with the work with Dr. Wynder and Dr. Hoffman. First of all, who's Dr. Wynder?

A. Dr. Wynder is an M.D. He is the president of the American Health Foundation, currently.

At that time, he was located at the Sloan-Kettering Memorial Institute, which is a cancer research hospital in New York City, of national renown, I should say.

He published initially two things: one, an epidemiological study, a case control study, indicating

a higher incidence of lung cancer among smokers than nonsmokers. He also, as I said, published initially the observation that you could produce tumors on the backs of mice, a selected strain of mice which were sensitive to development of tumors, with the application of tobacco smoke condensate.

Q. Okay. And who's Dr. Dietrich Hoffman?

A. Dr. Hoffman is a -- I believe he's a biochemist, who has been associated with Wynder in his laboratories from that time to the present.

Q. Are Drs. Wynder and Hoffman well-known in the field of tobacco and health research?

A. They are. I think between the two of them, they have published hundreds and hundreds of publications relating to tobacco, tobacco and health and composition of tobacco smoke.

Q. Did Dr. Wynder and Hoffman ever publish a treatise on the subject of tobacco and tobacco smoke?

A. By "treatise," I guess you mean a book?

Q. A book.

A. They did publish a book in I think 1967, the title of which was Tobacco and Tobacco Smoke, and there was no such authoritative book on this subject at that

time. It became a -- I think a world reference material.

Q. When did Lorillard scientists begin working with Drs. Wynder and Hoffman in the cooperative research efforts?

A. It started in the 1950s, after the publication by Wynder of his results on mouse skin.

Q. Were you personally involved in meeting with and working with Drs. Wynder and Hoffman in their work?

A. Yes. After I joined Lorillard, I personally cooperated and worked with both Wynder and Hoffman.

Q. Okay. Without going into too much scientific detail, tell us the nature of the research that was being done by Dr. Wynder and Dr. Hoffman and cooperatively with Lorillard?

A. Well, the general nature of the work was to try to determine what was causing the response, what in tobacco smoke was causing the response on mouse skin, and was there a way to modify this response.

The work involved such things as looking at the smoke condensate from different kinds of tobaccos. There are three -- for example, there are three types

of tobaccos that are blended for American cigarettes. One type is called flue-cured or Bright tobacco, that's grown from northern Florida, up the east coast, up into Virginia; another type that's grown principally in Kentucky and Tennessee, called Burley tobacco; and a

third type which is not grown in this country, called Oriental tobacco, sometimes Turkish tobacco.

And they are all -- have somewhat different compositions. And one of the early studies was to determine whether or not the smoke condensate from these three different tobacco types produced different responses on mouse skin. That was some of the early work, where we prepared materials and collected smoke condensate for Wynder's laboratory to do the bioassay.

Q. Okay. Were Drs. Wynder and Hoffman working under any sort of formal contract arrangement with Lorillard?

A. No. This was just a cooperation between scientists.

Q. Okay. And how did that collaborative process work?

A. Well, as I say, we prepared many of the materials, participated in discussions as to what might

be considered in the experiments. For example, there were conceivably additives that you could put on tobacco that would alter the burning process. This might produce a different response. There were some of these that were studied during that period.

Filters, when we developed selective filters for phenols, the question is: Did the smoke condensate

that came in through those filters alter the response of mouth skin? Those kinds of experiments were carried out.

And there was a general investigation, particularly, into trying to separate tobacco smoke condensate into different fractions and seeing which fractions contained the activity, with the overall purpose of identifying ultimately the compounds that were responsible for the activity on mouse skin.

Q. Did Drs. Wynder and Hoffman, in cooperation with Lorillard, in this time frame do any work on a chemical by the name of benzopyrene?

A. Yes. Yes, they did.

Q. What's benzopyrene?

A. Benzopyrene is an organic compound that is formed whenever you burn anything. It's present, kind

of ubiquitously, in our environment. It's present in the air in small quantities. It's present in, oh, for example, charcoal-grilled meats. That has benzopyrene on them.

And it was a compound that was found to be very -- in large concentrations in the soot of chimneys, and it became recognized and it was tumorigenic on mouse skin and other types of applications to the animals.

Q. What does "tumorigenic" mean?

A. It produces tumors in sufficient concentration in that bioassay. For that reason, people started to look to determine whether it was present in tobacco smoke. Because it had been identified in certain other areas, it was known to be an animal carcinogen.

The early effort was to try to identify it or isolate and identify it in tobacco smoke, and that work, I guess, was principally through the 1950s and kind of toward the end of the 1950s. Benzopyrene was unequivocally identified -- isolated and identified through tobacco smoke.

Its presence there is in very, very small quantities, one part per million of the collected

condensate. Nonetheless, it was followed up rather extensively as to whether -- whether or not it was responsible for the activity on mouse skin.

Q. And what was the conclusion of the research that Drs. Wynder and Hoffman, along with Lorillard, carried out on benzopyrene?

A. Dr. Wynder concluded that benzopyrene could contribute no more than two or two-and-a-half percent of the activity that was found on mouse skin.

Q. In working with Dr. Wynder and Dr. Hoffman,

did Lorillard try to find a way to keep cigarette smoke from producing this tumor activity in the mouse skin painting tests?

A. Yes. And that was through some of the methods that I indicated, addition of compounds that might be used to change the pyrolysis or burning characteristics of the cigarette. And one compound that was found to do that were a general class of compounds that are called nitrates, and the potassium nitrate was one.

And this did reduce benzopyrene. It also reduced the activity on mouse skin, when added to tobacco in sufficient quantities.

Q. Did Lorillard incorporate into the cigarettes

that it manufactured and sold these nitrate compounds or any compounds like them, to reduce the tumor activity?

A. No. No, we did not.

Q. Why not?

A. The reason we did not is that nitrates alter the composition of tobacco smoke in a rather dramatic way. Not only does it alter the benzopyrene, but many other things, and it was found that the nitrates could increase a class of compounds known as nitrosamines, which are also animal carcinogens, and particularly

lung carcinogens, in the animal.

And for that reason, and perhaps others, these nitrates were not added to tobacco in -- in quantities sufficient to alter the activity on mouse skin.

Q. Dr. Spears, was the research that was carried on by Drs. Wynder, Dr. Hoffman and Lorillard, together, through the '50s, and '60s, was all that work published in scientific journals?

A. Yes, it was.

Q. And did Drs. Wynder and Hoffman publish work

separately from Lorillard scientists, who also published work?

A. That's correct.

Q. How many scientific articles or presentations have you, yourself, co-authored or authored over the years, Dr. Spears?

A. Approximately 30.

Q. And have other Lorillard scientists published their work that's been carried out at Lorillard?

A. They have.

Q. By the way, Dr. Spears, was any of the research that you published, was any of that cited by Dr. Wynder and Hoffman in their book that you mentioned earlier, Tobacco and Tobacco Smoke?

A. Yes. My work that I had published was cited in that book.

Q. Did you actually act as peer-reviewer of portions of their book before it was published?

A. Yes, yes. This book we're talking about is one where Wynder was -- and Hoffman were editors of the book, or at least Wynder was the editor. And various individuals wrote different chapters in the book, and I reviewed a number of the chapters prior to their

publication.

Q. Have your publications also been cited in any Surgeon General's Report?

A. Yes, they have. I think six or seven.

Q. Dr. Spears, I want to turn now to the second cooperative program that you've outlined for us at the beginning, the Tobacco Working Group.

I want you to begin by telling the jury, what was the Tobacco Working Group?

A. The forerunner of the Tobacco Working Group was called the Less Hazardous Cigarette Working Group, under the Lung Cancer Task Force of the National Cancer Institute. It was formed by the National Cancer Institute.

The group that I was part of was an advisory group to that program, and the National Cancer

Institute set about a program to try to identify or really provide the information to develop what they referred to as a less hazardous cigarette.

The group consisted of a large group of scientists that undertook this task, and it continued up until, I think, 1977. So from about '68 to 1977.

Q. Okay. How did you personally get to be a member of the Tobacco Working Group?

A. I was invited to be a member of the Tobacco Working Group by the then-director of the National Cancer Institute, which is a Dr. Endicott.

Q. And just so we all understand, what exactly is the National Cancer Institute?

A. The National Cancer Institute is one of the Institutes of Health. It is the largest institute in the Institutes of Health. It has today well over a billion dollar budget, and its activities are both the sponsorship and conduct of research within their own laboratories in the field of cancer and cancer prevention.

Q. Okay. And is the National Cancer Institute actually part of the United States Government?

A. Yes, it is. It's part of the -- what I referred to as the Department of Health, Education and Welfare.

Q. Okay. Dr. Spears, have you helped us to prepare a listing that we can use just to talk about the members of the Tobacco Working Group during its existence?

A. I have.

Q. And is this that chart, Dr. Spears?

A. Yes, it is.

Q. I want to talk to you a little bit about the membership of the Tobacco Working Group, but first let me talk about the way we've organized this chart.

THE COURT: Will this be easier for you?

THE WITNESS: I can look at it.

Thank you.

BY MR. ROSS:

Q. We have three columns, and we've got them headed: public health, scientific community and tobacco industry.

Let's start with the first column. Let's refer to it by the column public health.

A. Public health column are those individuals that were either associated with the National Cancer Institute or with one of the other health institutes, and/or I guess we have the Department of Agriculture representative there, as well as the Surgeon General at that time.

Q. All right. The second column says: Scientific community. And what generally does that represent by the names listed there?

A. That represents individuals who were

associated with research institutes, private research institutes or universities, I believe in all cases; and I would say overall, these individuals were kind of world authorities on the subject of specific areas of the tobacco and health subject.

Q. The third column there, Dr. Spears, says: Tobacco industry. What does that represent?

A. These are the individuals from different companies that served on the Tobacco Working Group at some point or part of the time, at least during its duration.

Q. Okay. And what was the point of having this mix of people on the Tobacco Working Group, that is, people from the public health, people from the scientific community and people from the tobacco industry?

A. Well, I don't know that it was specifically to produce that mix, but it was to collect into this advisory group people who were regarded as the national and many times world authority on a subject that was relevant to the activity of the Tobacco Working Group.

Q. Okay. I want to just talk to you briefly about a few of the names on this chart.

First, under the column on scientific

community, I see Dr. Ernest Wynder and Dr. Dietrich Hoffman. Are these the same two scientists from Sloan-Kettering that you have talked to us about today that Lorillard worked directly with in the '50s and 60s?

A. They are the same people.

Q. I see Dr. Sam Battista from Arthur D. Little and Dr. Charles Kensler. Who are Dr. Battista and Dr. Kensler?

A. They were individuals at Arthur D. Little, which is a private research institute; and they had published extensively in two fields: one, mouse skin painting, and also in the area of the cilia activity, ciliastasis.

Q. And what is Arthur D. Little?

A. Arthur D. Little is a private organization whose product is research, and they do research for commercial purposes, principally for commercial purposes at their institution.

Q. We have listed up here Dr. Fred Bock. Who is Dr. Bock?

A. Dr. Bock was another individual who had

published extensively in the field of mouse skin painting and tobacco smoke and other kinds of

materials. He was located at Roswell Park Cancer Institute, which is in Buffalo, New York, where I was for a while. As a matter of fact, I did do a project with Roswell Park at one time.

Q. What is Roswell Park?

A. Roswell Park is a hospital in Buffalo, New York, and it is a research institute; and at the time, it took patients with advanced cancer and treated them sometimes with some experimental methods that were not available otherwise.

Q. Now, going over to the column on public health, one of the names I see here as a member of the Tobacco Working Group is Dr. Jesse Steinfeld. Who is Dr. Steinfeld?

A. At the time of the formation of this group, he was the Surgeon General. He didn't stay with us very long, I think maybe only one meeting. But he was the Surgeon General at the time it was formed.

Q. I also see the name Dr. Tso, if I've pronounced that correctly. T-S-O?

A. That's correct.

Q. Who is Dr. Tso?

A. Dr. Tso was a scientist with the Department

of Agriculture; and at the time, the Department of Agriculture had major programs related to tobacco, particularly the growing of tobacco and pesticide use on tobacco, development of new varieties of tobacco, and they also had programs that were aimed at trying to modify the composition of tobacco with respect to some of the bioassay systems. And Dr. Tso was in charge of that work for the Department of Agriculture.

Q. Just so there's no confusion, did all of the people whose names are listed on this chart serve on the National Cancer Institute's Tobacco Working Group during the entire time period of its existence?

A. No. These are people who served at some point or some of the time. A few of them may have served the whole time, but there were people who came in and people who went out during the course of this ten years.

Q. Did you, yourself, Dr. Spears, serve on the Tobacco Working Group during the entire time that it existed?

A. I missed the first meeting; and other than that, I served the whole time.

Q. Dr. Spears, in general terms, describe for the jury how the interaction among this diverse group of scientists from the government, scientific community

and tobacco industry worked. What was the working relationship like?

A. The working relationship was, I would regard it as collegiate, individuals anxious to contribute their knowledge to the project, the activity at hand, a very cooperative kind of environment, and, as I said, one that people were anxious to contribute their expertise to.

Q. You told us, Dr. Spears, that the goal of the Tobacco Working Group was to create a less hazardous cigarette; is that correct?

A. That is correct.

Q. Describe, in general terms, for the jury, how did the Tobacco Working Group go about trying to develop a less hazardous cigarette?

A. The initial activities were to divide people up into small groups and have them discuss this -- bring everybody up to kind of the state-of-the-art with respect to their area of expertise, and ultimately to develop procedures and protocols as to how one might go about certain aspects of the work in developing a less hazardous cigarette.

For example, the group discussed various possibilities in terms of bioassay systems, and ultimately adopted as one of its main bioassay systems

the skin -- mouse skin painting model which produces tumors on the backs of mice with cigarette smoke condensate as one of the models that would be used. And the reason for that is it was the only model known at that time that produced tumors that could be used as a model and compare potentially different kinds of cigarettes and cigarette variants.

After identifying the fact that that was a model that would be used, a bioassay model, then we spent time in trying to define exactly how that model should be applied; and that meant the number of animals that would be used in each experiment in order to conclude that there was a sufficient statistical power to measure differences, let's say, of 25 percent.

There were sessions that were held to try to identify the kind of cigarette variants that would be included in the test using this model; and that involved all of the people, and it involved repeating some of the work that was in the literature; for example, some of the work that I talked about earlier that Dr. Wynder had done and we had supplied materials for, and that was the beginnings of the program.

Other aspects of the program were, let's try to develop other models that are more relevant, obviously more relevant to the human being, and these

were inhalation models, using animals as the inhalation model.

And that was another significant activity, major activity of the Tobacco Working Group, over time, to try to develop bioassay models that would be more relevant than the mouse skin painting.

Q. Did the scientists who made up the Tobacco Working Group reach a determination about, in general, the validity of mouse skin painting tests as a model for human beings?

A. I think the general feeling was that this was not -- obviously, it was not a very good model, in that the mouse skin, number one, does not respond to agents in the same way that tissue in the respiratory tract responds. For example, some of the animal carcinogens are not carcinogens in terms of material you apply, but that they're activated through enzymes that exist in the cells, to an active material that is the so-called

approximate carcinogen.

Mouse skin does not have all of those enzymes in it, for example, and it doesn't activate some of the compounds that might be active in the lung. So, even -- even it may be underestimating something in that respect.

In another respect, the quantities that are

applied in mouse skin are horrendous compared to any quantities that might be found on exposure to the respiratory tract from cigarette smoke.

Also, one worries about changing the composition of smoke when you collect it, condensate it and put it into a solvent and drive off the water and other things before you can use it in applying it to mouse skin. So, there are, you know, a fair number of reasons that one ought to be very cautious about the mouse skin model being relevant to the human being.

Q. Okay. Let's talk a little bit more specific about some of the things you outlined for us. You told us one of the things the Tobacco Working Group did was to come up with types of modifications and variants of

cigarettes to test.

Let me ask you first, were modified cigarettes actually tested by the Tobacco Working Group's efforts?

A. Yes. There were, I think, during the course of the activity, 60 or more different variants tested on mouse skin.

Q. Okay. Now, when you test -- when you come up with a modified cigarette to test, do you have to test it in comparison to some other cigarette?

A. That's correct.

Q. Okay. And what was it that the Tobacco Working Group chose to test as the comparison to the modified cigarettes?

A. There were two comparisons made, through some of the work, and then I -- and then always present was a reference cigarette that was produced for this work, specifically.

The other reference material was one that was produced and supplied through the University of Kentucky, called the Kentucky reference cigarette. The difference between the Kentucky reference and the

reference called the standard experimental blend for this work was basically the Kentucky reference was constructed in a way to represent cigarettes as best one could that were produced in the 1950s.

The standard experimental blend produced for this work was of all of the same tobaccos that were used to make the modifications. In other words, if one were going to add, say, potassium nitrate to a blend of tobacco, it would be added to that standard experimental blend so that there were no changes in the tobacco composition, per se, or one could refer back to it through this experimental blend.

Q. Dr. Spears, why did the Tobacco Working Group choose to test these modifications in comparison to a

Kentucky reference cigarette or a standard experimental blend, rather than just, say, comparing it to a Marlboro or a Newport cigarette or any other cigarette that you just pulled out of some package in the store? Why do you use these reference cigarettes?

A. Well, you always run -- you always run controls in these experiments, and the control is

something you expect a certain response from this control, and the standard experimental cigarette was run repeatedly, and each time some of these studies were initiated with some of the variants we talked about, one would expect a certain response from that experimental blend. If you don't get it, you know something has gone wrong; either the animals have changed, some of the procedures have changed. So the control is a very important part of the experiment.

You want to -- you want to be certain that the control has not changed, and the only way you can be certain of that is to prepare something which is not varied. If you chose a commercial cigarette, you have no assurances that it won't change. As a matter of fact, we know it does.

We know we've changed our products over time. We know that our competitors have changed their products, so a commercial product would not be a

suitable control for this kind of work.

Q. Now, you say that the Tobacco Working Group considered using animal inhalation testing or coming up with models for animal inhalation testing for these modified cigarettes rather than mouse skin painting;

correct?

A. That's correct.

Q. What were the results of the efforts by the National Cancer Institute's Tobacco Working Group to develop animal inhalation tests for testing cigarettes?

A. One of the studies in the literature that was reported prior to this time was a study in dogs that had undergone tracheotomies, that is, a hole in their trachea, through which cigarette smoke was induced, and it was reported to have produced tumors in the lungs of these animals after I think two years of exposure.

That was picked up as a possible model, and experiments were initiated along the lines of what was reported in the literature. There were some differences made in the experimental protocol, but the same investigator who had reported the work in the literature was also the pathologist on this project.

Q. What was his name?

A. His name was Oscar Auerbach.

A second activity that was undertaken --

since dogs are expensive and you can't do very many in a group, for obvious reasons, there was a desire to

have a small animal, and there were attempts to use the rat as a -- also in an inhalation model, and contracts were let with the laboratory to carry out that experiment.

Q. Okay. And what, if any, results arose from those experiments, animal inhalation experiments?

A. After several years with the dogs -- and let me maybe just explain the modification that was made. In the original work, the cigarette was literally inserted into the dog's trachea, and as the dog breathed, he puffed on this cigarette. So he kind of had the stress of trying to puff through a cigarette as he breathed, which of course is not the way the human being does it. And this was a very stressful experience for the dogs.

And in this experience, the smoke went in through a tube, and then the dog was exposed intermittently, rather than the way it was done in the early experiment.

There were measurements made under both procedures with radioactive tracers on the tobacco smoke to show that the doses were equivalent; but in this latter experiment, the pathology was very minimal.

There were no tumors. So, the original work could not be duplicated. This was towards the end of the Tobacco Working Group activity, and it was not followed up further.

Q. So essentially the inhalation work that the Tobacco Working Group did, did not produce tumors in these inhalation studies?

A. That's correct. And that was also the case with the rat. They claimed, I think, originally a minimal number of tumors, but again, on repeating that work a second time, it did not yield tumors. So both of these fail as being experiments that produced tumors and/or, secondly, they fail as a useful bioassay system from a tumorigenic end point.

Q. Okay. Now, you said that the principal program carried out by the Tobacco Working Group was to make modifications to cigarettes and see if that reduced the presence of tumors in mouse skin painting tests; correct?

A. That was certainly a large part of the program.

Q. Okay. And have you helped me prepare, again, just a demonstrative exhibit to help discuss some of the various modifications to cigarettes that were attempted by the Tobacco Working Group?

A. Yes, I have.

Q. Dr. Spears, is this that exhibit?

A. Yes, it is.

Q. I wanted to talk to you briefly about the attempts made by the Tobacco Working Group to modify cigarettes, to make them less hazardous, these tests. The first one -- well, first, on the left, we have a group of things that have been entitled: Tobacco modifications. What does that generally refer to?

A. It refers to modifications of the tobacco. It would include types of tobacco listed here, tobacco substitutes, tobacco modifications through changing the growing conditions, whether or not the pesticides/insecticides that were used on tobacco had any impact on the response on mouse skin.

Q. Okay. All right. Let's go through each of these.

The first one under tobacco modifications is types of tobacco. Briefly describe for us what were the things that the Tobacco Working Group attempted to do in the area of types of tobacco.

A. Well, this was largely to try to replicate the work that I talked about earlier, that Wynder had done.

And I talked about three types of tobacco

used in American blended cigarettes, the Oriental, the Burley and the flue-cured or Bright tobacco. These experiments were basically a repeat and confirmed the results of Wynder, that the Burley tobacco, which has more nitrate in it, has a little lesser response on mouse skin.

Q. The second item up on the list says: Tobacco substitutes. What did the Tobacco Working Group attempt to test in the area of tobacco substitutes?

A. Yes. Two of the chemical companies, one in England and one in the U.S., had developed what they called substitute tobacco materials, and they were synthetic materials which they thought might provide reduced activity on mouse skin, and if so, they might be incorporated as kind of a filler in a cigarette, offsetting some of the tobacco that was present.

These were studied, to try to confirm what the chemical companies were saying. In this case, we could not confirm it in the studies by the Tobacco Working Group, and the tobacco substitutes did not turn out any different than tobacco on -- I'll call it gram-to-gram basis, which means you always apply the same amount to mouse skin, whether -- regardless of the yield of the cigarette.

So if you applied a gram of this material and

a gram of that material, that would be the tobacco -- that would be the skin painting experiment, even though one cigarette might yield half as much as another. That's not considered in these studies, per se.

Q. Okay. Let's just talk briefly about these last two, and maybe that would be a good time for our morning break, before we move on to the rest.

Tell the jury about what kind of growing conditions did the Tobacco Working Group attempt to study.

A. Well, there are various cultivation practices when you grow tobacco, and one of those is removing the suckers from the plant, which are the small shoots that appear during the growing season, and they detract from the energy that goes into the main leaf. And these are removed so that you get good leaf development, or they are treated in a way that they don't develop.

And we studied, in this case, I think some of the agents that were used to prevent suckers from appearing: One was malichydradize; and the other was a commercial product I think known as Offshoot T, which

is a fatty alcohol that's applied to the developing sucker, and it prevents further growth.

The question was, did these -- the addition of these compounds have any affect in the mouse skin

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bioassay?

Q. Okay. And the last one over here, what did the Tobacco Working Group attempt to do in the area of pesticides and insecticides?

A. They're -- there are certain insecticides, pesticides that are registered for use on tobacco, that the farmers use, and the question was: Were they adding anything to the response on mouse skin?

And the experiment was an experiment where tobacco was grown, using added amounts of these insecticides, pesticides, and also tobacco was grown on Prince George Island, which I understand the wind is always blowing from the east to west, and since it's right there on the ocean, you get no contamination from any source, carried by the air or otherwise. That tobacco was compared with tobacco grown with insecticide/pesticides.

Again, there was no difference in the response on mouse skin painting.

MR. ROSS: Your Honor, I think this might be a good time for all of us to take a break.

THE COURT: I guess we could. I guess we will.

Okay. We'll take our break.

(The jury exited the courtroom.)

THE COURT: During the break, Doctor, you must not discuss your testimony with anybody, including the lawyers.

THE WITNESS: Fine.

(A brief recess was taken.)

THE COURT: Okay.

Let's bring the jury out.

THE BAILIFF: Bringing in the jury.

(The jury entered the courtroom.)

THE COURT: All right. I guess we can be seated. Thank you.

Yes, sir.

MR. ROSS: Thank you, Your Honor.

BY MR. ROSS:

Q. All right. When we broke, we had finished talking about the tobacco modifications that were tried by the Tobacco Working Group. Let's move to the other column here that's entitled cigarette construction

modifications.

And generally, what does cigarette construction modification refer to?

A. Well, cigarette construction modifications are modifying any of the other components of tobacco, cigarettes, other than the tobacco itself, although I guess you might consider reconstituted tobacco blends a

modification of the tobacco itself.

Q. All right. Let's talk about each of these, again, briefly.

The first item is filter modifications. What did the Tobacco Working Group try in the area of filter modifications?

A. There were a number of filter modifications. One that I recall was a patent invention by one of the tobacco companies which used a chemical oxidant to try to modify cigarette smoke composition. That was evaluated. Also the -- whether or not ventilation or highly ventilated filters made any difference. It did make a difference in the composition of smoke, and this is where you put holes, basically, in the filter so

that air comes in through these holes and dilutes the smoke and changes the puff profile and, therefore, the composition of smoke at the burning end of the cigarette. That was evaluated, that kind of thing.

Those were the principal filter modifications that I recall that were subjected to skin painting.

Q. All right. The next item, paper and wrapper modifications. What does that refer to?

A. This refers to modifications in the cigarette paper. Again, you can modify the composition of smoke somewhat by choosing very porous papers or very

nonporous papers.

You can also change the chemical additives that are on the paper that effect its burning properties. These were the kind of things that were evaluated here in the program.

Q. Next is something the jury has heard a little bit about before, reconstituted tobacco blends. So just tell us briefly, what did that have to do with?

A. Reconstituted tobacco sheets are generally sheets that are made from tobacco that becomes too small to incorporate into the cigarette directly. It also incorporates a component of the blend which is

referred to as the stem of the tobacco, the leaf, the little veins in the leaf that are separated during the process. These are included in the tobacco sheet formation.

There are two processes for making tobacco sheets, and the two products from the two different processes were studied as some of the variants here. One process is the so-called paper-making process, where you separate water soluble materials out from the tobacco parts, form the sheet from the fibers that remain and then add the water soluble materials back.

The other is to use very little water and try to homogenize everything together and cast this into a

sheet. And the two different processes or products from the two different processes were studied by making sheets of our standard experimental blend as a control.

Q. What about the next product, expanded tobacco?

A. Expanded tobacco is something -- technology that was developed in the early 1970s, and it basically is a process where you moisten the tobacco and inflate

the cells back to their original size when they're in the green state, green-leaf state. Of course, as you dry tobacco, dry a leaf, it shrinks, and this expanded tobacco then occupies more space in a cigarette, and it has some economic advantages to incorporating it into the blend.

There were two separate processes known at the time for expanding tobacco. One involved the use of carbon dioxide as the expanding agent, and the other used a freon based expanding agent; and both of these were studied with respect to the mouse skin assay.

Q. And the final item on our board, additives, what does that refer to?

A. It refers to things like the potassium nitrate that I described earlier.

One of the companies thought that they had developed something internally that would alter the

response on mouse skin, and this was -- I guess, flowed out of the palladium work at Liggett and Myers, and these were the materials that they submitted, which they thought might modify the response on mouse skin.

There were other additives studied. Some of these were the major additives to tobacco that are used

by most manufacturers, including such things as sugars and cocoa. They were part of these studies, as well.

Q. Now, Dr. Spears, in this program, about how many experimental cigarettes that incorporated various of these modifications were actually made and tested during the lifetime of the Tobacco Working Group?

A. There were millions of cigarettes made. I don't have exact numbers, but a very large number of cigarettes in terms of what you would normally think of in experimental programs.

Q. And where did these millions of cigarettes, with all these modifications, come from?

A. They were made by the tobacco manufacturers, cigarette manufacturers, kind of shared in the activities. Some of them were made by one company; others made by another company. That sort of thing.

Q. Incidentally, when we were looking at the chart that had the make-up of the Tobacco Working Group, we mentioned the third column and talked about

what it was, the tobacco industry, but we didn't talk about one thing specifically.

In addition to yourself, did each of the other American manufacturers of cigarettes have a

representative on the Tobacco Working Group?

A. Yes, with the exception of American Tobacco.

Q. Other than American, they were all represented?

A. That's correct.

Q. Would you tell the jury briefly what it was that was learned by the Tobacco Working Group with all of the millions of cigarettes it modified and tested in its goal of making a less hazardous cigarette?

MR. ROSENBLATT: Well, objection. I think the witness can testify as to what he learned, but what did every member of the Working Tobacco Group learn is a little too broad.

THE COURT: Well, only insofar as the institute reached a composite view, that's fine.

BY MR. ROSS:

Q. In that sense, go ahead.

A. Yes. I think the composite view was contained in the -- in the reports that were written by the staff, the Cancer Institute, reviewed by The Working Group, that is, they were able to confirm some

of the things in the literature, with respect to mouse

skin painting.

The differences that were found were relatively small, probably of not great consequence, and the main recommendation coming out of the National Cancer Institute studies were that general reduction techniques were probably the obvious direction that came out of it; in other words, there are dose responses. The more you apply, the greater results you get to the mouse skin, up to a certain limit where the animals don't survive; and the less you apply, you get fewer and fewer and essentially no tumors, so that general reduction in cigarette smoke condensate was thought to be a desirable direction by the National Cancer Institute.

Q. Did Lorillard or, to your knowledge, other manufacturers of cigarettes in the United States, incorporate into their cigarettes any or all of the modifications that were tested by the Tobacco Working Group that we've talked about here?

A. Yes. Yes, we did.

The modifications that produced small differences were the reconstituted tobacco sheets. They a little less active, and those were incorporated into, I think, industry blends in the 1960s, the

expanded tobaccos incorporated into different company blends.

That also showed a reduction in the mouse skin tests, albeit rather small. There were some paper modifications were being employed in terms of low porosity -- or high porosity papers that were already employed by the manufacturers.

And we've already described filters and ventilated filters that were also being applied.

Q. How much time did you personally devote in your own working career to the Tobacco Working Group during the years that it was in existence?

A. Well, when it first started out, I spent quite a bit of time, in that there were frequent meetings and tasks that required a lot of work to provide overviews of certain areas and so forth.

I would say probably over the whole time period, maybe around ten percent of my time, but heavy in the beginning and less so at the end.

Q. Now, before the break, you had mentioned that when the Tobacco Working Group began, the first thing it did was go through what you called a series of presentations where people brought other members of the group up-to-date about knowledge they had in their particular fields or expertise?

A. Yes, that's correct.

Q. Did Lorillard openly share with the other members of the Tobacco Working Group all of the information that it had learned from its own research and development activities into less hazardous cigarettes prior to the start of the Tobacco Working Group?

A. Yes, we did. And that included such things as bringing Dr. Dalhamn and Rylander in from Sweden to present overviews of their work and their theories on ciliastasis, for example, and other areas in terms of lung defense mechanisms.

Q. Did the representatives of the other tobacco manufacturers who were represented on the Tobacco Working Group, Liggett and Myers, Brown & Williamson, RJ Reynolds, and Philip Morris, did their representatives, at least as far as you know, also openly share information with the rest of the group about their own internal research activities?

A. They all shared information with the Tobacco Working Group.

Q. Speaking for Lorillard, was there any research or information which Lorillard knew about that would have aided the Tobacco Working Group in its effort to develop a less hazardous cigarette that you

didn't share with the scientists on that group?

A. No. We have published all of our work that's relevant and/or made presentations to the group. No, there's nothing that we did not share with this group that we had that would be considered relevant to the question.

Q. Was the Tobacco Working Group's research effort a large effort in investigating ways of producing a less hazardous cigarette?

A. Yes. It was really the only cooperative effort in the world, and it received a lot of attention from around the world, in terms of people in the tobacco and health field visiting the sessions of the Tobacco Working Group and asking questions and making observations.

Q. About how much money did the Tobacco Working Group spend on its research effort, to your knowledge?

A. I would say around 50 million, 50, 60 million dollars.

Q. Now, you mentioned earlier, did the Tobacco Working Group issue public reports of its work?

A. Yes, they did. There were reports of the experiments and also I think annual reports written on the program.

25 Q. Were those -- who actually issued the reports

1 of the Tobacco Working Group?
2 A. They were -- they're issued by the Department
3 of HEW, under the National Cancer Institute.
4 Q. In addition to the actual reports, the five
5 reports that you've mentioned, did researchers who did
6 work as part of the Tobacco Working Group also publish
7 articles in peer-reviewed scientific journals?
8 A. Yes, they did.
9 Q. Do you know approximately how many scientific
10 articles were published as a result of the Tobacco
11 Working Group's efforts?
12 A. I think the number is something like 400, 4
13 to 500. I don't have the exact number.
14 Q. Now, when did the Tobacco Working Group end?
15 A. It ended in 1977.
16 Q. Please, tell the jury why the Tobacco Working
17 Group ended.
18 A. In 1997, a new director of --
19 Q. Excuse me. You said 1997?
20 A. Excuse me. 1977. A new director of the
21 National Cancer Institute came into office, and his

name was Arthur Upton, and he changed the policy of the Cancer Institute from one of participating in an effort to find the less hazardous cigarette to one which was a public policy statement that the government should not

be doing this -- be into this kind of work and that their position should be that no one should smoke.

Q. So did the National Cancer Institute disband the working group?

A. They did. In 1977, they -- yes, '77, the activities stopped. Experiments that were in progress, some of them were terminated in the middle -- middle of the activity.

Q. Was Lorillard ready to continue cooperating with the United States Government, through the Tobacco Working Group, if the program had not been terminated?

A. Yes, we were, certainly.

Q. What was your reaction on behalf of Lorillard to the termination of the program?

A. Well, I tried some avenues to get it extended and reestablished. Particularly I spoke with our local

representative of Congress at the time, who was Richardson Pryer, and talked to him about possible inquiry on his -- through him as to the possibility of continuing the work. That was not successful, and the work was terminated.

Q. Dr. Spears, how did you personally feel about the termination of the Tobacco Working Group?

A. I was disappointed. I thought it was a unique effort. It was certainly bringing all of the

right people together who had expertise in the area, and they had produced a lot of information, although not too much of it was useful in terms of producing a less hazardous cigarette, but the -- certainly good information was being produced, and there was progress being made.

Q. After the Tobacco Working Group was disbanded, did Lorillard continue its own efforts to develop a less hazardous cigarette that would be acceptable to smokers?

A. Yes, it has.

Q. Tell the jury some of the efforts in that regard.

A. Well, we have had, I guess, a continuing

project to develop experimental products that would show up with less activity in various bioassay systems. Excuse me. And various ideas have been pursued over time using both chemical measurements and bioassay measurements, and that includes the mouse skin painting.

We have, I guess, patented one item as we came along that may not be commercially practical, we haven't decided yet, but it certainly does show up well, in some of the bioassay systems, and that's a product we call a hollow cigarette where a -- there's a

channel down the center of the tobacco, and this results in kind of an inverted fire-cone appearance that causes the heat of combustion to be much higher, and dramatically reduces some of the kind of materials such as benzopyrene.

Whether it's a commercially practical product or something that would interest the consumer, I'm not prepared to say at the moment.

Q. Has Lorillard, as yet, test-marketed the hollow smokeable article?

A. No, we have not.

Q. Has Lorillard -- after the disbanding of the

Tobacco Working Group, did Lorillard continue any work in the field of tar and nicotine?

A. In the field of tar and nicotine?

Q. Yes.

A. Well, we have certainly looked at a proposal or research idea or concept that came out of the Tobacco Working Group, as well as some other health-related individuals at the time, and that is, that if you could produce a cigarette with a certain nicotine level and reduce the tar without reducing the nicotine, under the assumption that people smoke in a way to obtain a certain amount of nicotine, that they would thereby get less tar, so this would be kind of a

selective reduction of tar relative to nicotine.

Another way of putting it is, the nicotine-to-tar ratio would be higher than in the normal product.

Q. Okay. I want to talk to you in some more detail about that project that you just described. I'll get two of these out of the way. Well, that gets it out of the way.

And just by way of introduction to this, let's go back to something we talked about briefly

this

morning. I think you told us, but just to remind us, on a sales-weighted average today, if you compare the tar and nicotine levels of cigarettes that are produced and sold in this country, how do they compare to the tar and nicotine levels that were produced and sold, say, 25 years ago?

A. Both the tar and nicotine have been reduced by about 65 percent.

Q. Now, why have you engaged in efforts to develop cigarettes with reduced levels of tar and nicotine?

A. Well, we thought, number one, that there was a market out there for lower tar cigarettes, lower tar, lower nicotine cigarettes; and over time we've continuously tried to develop products that were

acceptable to the consumer, that would give us an opportunity in the marketplace.

And over time we've introduced cigarettes with lower and lower tar and nicotine values. They are generally acceptable to a smaller and smaller percentage of smokers, so that as you go down in terms of tar and nicotine yield, your market success gets

smaller and smaller, in terms of market share.

So, part of our activity has been, how could we improve the taste of these low tar cigarettes to make them more acceptable to the consumer? And that's been kind of a major activity, in terms of our research and development over time.

Q. Generally, if you reduce tar in cigarette smoke, what happens to the level of nicotine in the cigarette smoke?

A. Generally it's reduced, proportionally.

There is a small exception to that, and that is, if you use air ventilation in the filter, you get a little more reduction of tar than you do of nicotine; but in the overall scheme of things, it's not highly significant.

Q. Is a reduced tar cigarette a safer cigarette than one that has higher tar?

A. Well, if you assume that tar is the

responsible agent for an activity, or a disease, and you can reduce the tar to -- the exposure to tar and actually the dose, then it is logical to conclude that it would be safer.

Q. What, if anything, does nicotine have to do with flavor in the cigarette?

A. Well, I think it's an important flavor component of cigarette smoke. It contributes to the overall robust feeling in the mouth or oral cavity. It also contributes to the -- I guess we call it impact in the upper throat area. When you inhale the smoke, a feeling of strength. Those are the two main contributors that I would regard as basic contributors.

Q. Did the Tobacco Working Group that you've told us about here today, did it study the relationship of nicotine and flavor at all?

A. Yes, it did, through a contract Arthur D. Little. And a contract was let, which dealt with some of the reconstituted sheet cigarettes, which contain some additives that caused them to produce very low tar numbers and very low nicotine numbers, and these were the items that Arthur D. Little tried to improve through various flavor methodologies.

Q. Did the Tobacco Working Group reach any collective conclusion as to the relationship of

nicotine to flavor?

A. The conclusion of the Arthur D. Little work

was that nicotine was an important flavor material, and that it was key to improving these products, in terms of consumer acceptance, or flavor.

Q. Now, you mentioned a few moments ago that some ideas came out of the Tobacco Working Group about changing the tar-and-nicotine ratio. What was that about?

A. Well, it was another effort to try to conceive of a way to reduce the tar exposure, and it came out of the idea that perhaps people smoked, in part, for nicotine. And if you could reduce the tar relative to nicotine, then you would have a lower tar exposure. And that if people smoked for nicotine at a given level, tar is reduced, that would be the result.

Now, of course, the opposite of that is if you can raise the nicotine and leave tar alone, then they would smoke less of that kind of a cigarette for nicotine and again get lower tar. And these were suggestions that were coming out of the National Cancer Institute program.

It was also a suggestion that came out of England, an investigator by the name of M.A. Russell, all along about the same time period.

Q. Okay. What was the time period that these suggestions were out there in the literature?

A. These are in the early 1970s, middle 1970s.

Q. Okay. Did Lorillard pursue the idea of the development of such a cigarette as you've just described, one with a changed nicotine/tar ratio?

A. Yes, we did. And others as well, including the Department of Agriculture pursued that kind of activity.

Q. Did the research program at Lorillard pursuing such a cigarette have a name?

A. Yes. We gave the project the name of Nicotine Augmentation Project or NAP.

Q. Okay. What was the time frame of the Nicotine Augmentation Project at Lorillard?

A. I believe it started in the early 1970s and continued through the early 1980s.

Q. What was the goal, what were you trying to accomplish, in the Nicotine Augmentation Project?

A. Our goal was to try to produce very low-tar cigarettes that had a higher acceptability and, therefore, would be used by the smoking public through the possible increase of nicotine relative to what you would get in these kind of products by the cigarette construction techniques that were available.

Q. All right. In order to help everybody, the jury and everybody else here, understand this goal a little bit better, let's put just some numbers up here so we can see them.

In the early to mid '70s, what was the average tar and nicotine delivery of a cigarette on the market in the United States?

A. I would say about 14 or 15 milligrams tar and about 1 milligram nicotine.

Q. 14 to 15 milligrams of tar?

A. Tar.

Q. And about 1 milligram --

A. 1 to 1.1 milligram nicotine.

Q. Okay. So this was, let's say, mid 1970s; correct?

A. That's correct. Sales-weighted average.

Q. All right. Now, in the Nicotine Augmentation Project undertaken by Lorillard, what was the tar level of a cigarette that you were trying to develop in that project?

A. 2 milligrams.

Q. 2 milligrams.

Okay. If you used any of the type of techniques that we've talked about to reduce tar up until now, to reduce tar from the 14 to 15 milligrams

down to 2 milligrams, what would be the average nicotine delivery of such a 2 milligram cigarette?

A. About .2 milligrams.

Q. Okay.

Let's call that reduction techniques. That's what you would end up if you used all those other kinds of reduction techniques we've talked about.

A. That's correct.

Q. All right. What happens to the taste of a cigarette that has 2 milligrams of tar and .2 milligrams of nicotine?

A. It's greatly reduced.

Q. What was the nicotine level of the 2 milligram cigarette that Lorillard was hoping to achieve through the efforts of the Nicotine Augmentation Project, NAP?

A. I think initially we conceived it would be in the range of .4, .5.

Q. .4, .5?

A. .4.

Q. And just so we're clear, at any time during the existence of what's called the Nicotine Augmentation Project, was Lorillard attempting to create a cigarette that would have higher nicotine than the 1 to 1.1 milligrams of nicotine that were in the

average sales-weighted average cigarette at that time in the marketplace?

A. No. That was not our objective. Our objective was the 2 milligram product with a greater consumer acceptance, and we thought the key to that was through a higher nicotine level.

Q. Now, the plaintiffs have introduced in this case into evidence a number of documents that come from the files of Lorillard that use words in them such as nicotine augmentation, nicotine migration or nicotine manipulation.

What do these documents refer to, Dr. Spears?

A. They refer to --

MR. ROSENBLATT: Well, I would -- if we're going to talk about documents generically, we should talk about a specific document.

MR. ROSS: He can show them on cross.

THE COURT: Yes. We can do that, but I think at this point he's trying to define the terms.

MR. ROSS: Right.

THE COURT: So if we're talking definitions, that's one thing. If we're going to talk about how it's used in the article, that's a different thing.

MR. ROSS: That's all we're talking about.

25 THE COURT: All right.

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1 A. The entire project was, as you indicated, to
2 produce this kind of a product; and a whole series of
3 techniques were considered as to how one might achieve
4 this, or something akin to it.
5 And the terms manipulation, augmentation,
6 addition of nicotine, transfer of nicotine from one
7 item to another, migration, these were all terms that
8 were used to describe some of the processes that were
9 being considered to achieve this result.
10 BY MR. ROSS:
11 Q. Dr. Spears, do those words, "manipulation,"
12 "augmentation," have some sort of bad connotation to
13 them?
14 A. No. They simply meant that we were trying to
15 increase the nicotine in this kind of a product.
16 Q. Was Lorillard successful in the laboratory in
17 making a cigarette that had very low tar but slightly
18 higher nicotine than what would have been achieved by
19 the usual reduction techniques?
20 A. Yes. Experimentally, we were successful.
21 Q. Did Lorillard ever manufacture and sell to
22 the American public any such cigarette as was the goal

of the Nicotine Augmentation Project?

A. No, we did not.

Q. Why not?

A. We found that these cigarettes were also not acceptable, less -- actually less acceptable than the one you had above. They were highly irritating to the smoker, and we abandoned the project ultimately as being on the basis of a false premise, that we could make highly acceptable cigarettes with these elevated nicotines.

Q. During the course of the Nicotine Augmentation Project at Lorillard, was the concept of changing the pH of cigarette smoke discussed?

A. Yes, it was.

Q. Was it discussed as a way of creating more free nicotine in the smoke?

A. Yes, it was.

Q. As a result of the Nicotine Augmentation Project, did Lorillard, in fact, ever add anything to its cigarettes that it sold to the public that raised the pH of cigarette smoke?

A. Not as we have measured pH in smoke. We have seen -- there's been no change in the Lorillard products as a result of this project.

Q. Did it add anything as a result of the Nicotine Augmentation Project to the cigarettes it sold to the American public to increase the free nicotine of its cigarettes?

A. No, it did not.

Q. As a result of the research conducted during Lorillard's Nicotine Augmentation Project, has Lorillard ever produced or sold to the American public a cigarette with enhanced levels of nicotine?

A. No, we have not employed this technology, for the reasons that I gave you.

Q. Has Lorillard ever added nicotine to any of its commercially sold cigarettes?

A. With two minor exceptions, the answer is no. And the two minor exceptions are as follows: We employed denaturing alcohol as a solvent to add some of the flavoring materials to tobacco, and the denaturing agent we used in that alcohol is nicotine.

The amount present is very small, in terms of what gets on the tobacco. And we've estimated that it's in the range of a few parts per million, whereas

the naturally occurring nicotine is in parts per hundred, so it's a trivial amount that is added through this denaturing agent in the alcohol.

And of course the purpose of the denatured alcohol is for industrial purposes; you don't have to pay the alcohol tax that would be due, nor do you need to have the level of security and control over the alcohol in storage that you would if it were a taxable

alcohol.

Q. Who actually puts this trace amount of nicotine in the denatured alcohol that you use?

A. The manufacturer of the alcohol, the supplier of the alcohol.

Q. I believe you mentioned there were two?

A. And the other was at one time -- we no longer do, but we employed a flavor which was manufactured by another company, a flavor company, and it included some of an extract of tobacco; and this extract of tobacco had some nicotine in it, and when applied in the way that we added it and the amount that we added it, it contributed about the same level as the alcohol, a few parts per million.

So, here again, it's a very trivial addition and would not be significant in any way. Actually, it's so small you can't -- you couldn't measure it analytically.

Q. Other than in those two ways, has Lorillard added nicotine to any of the cigarettes it sells to the public?

A. No, we have not.

Q. You've testified today, Dr. Spears, at some length about biological testing that Lorillard has done. Has Lorillard conducted biological research in

its own laboratories in Greensboro, North Carolina?

A. Yes, we have.

Q. Give some examples, just briefly, of the biological research that Lorillard carries on in its own labs.

A. Well, it's varied over time in terms of the nature of the activity, but I guess in the 1960s when we were developing bioassays and applying them, related to the ciliastatic -- ciliastasis activity, we developed bioassays using frog esophagus, which has cilia. We used some clams, which also have cilia.

We used rabbits, cats, and Guinea pigs in this activity, as well, in terms of making

measurements

along exposure -- after exposure to tobacco smoke and measuring effects on the cilia of these various organisms.

We carried out a series of studies that related to animal inhalation work, where we were trying to determine the amount of material that actually was deposited in the respiratory tract of the animals, with smoke exposure. And this became a very important issue in that many people believed at the time that the reason one didn't get tumors in the respiratory tract of animals was smoke exposure, was that these animals were called obligatory nose breathers, in other words,

they always breathed through their nose and the nose was an effective filter for the tobacco smoke, and it was important to know whether that was true or false.

And we spent quite an effort in developing tracers where we could analyze for these tracers when they were incorporated with the tobacco smoke, and actually determined the level of deposition in various animals with various kinds of exposures.

This work was done, I think, through the 1970s, since the NCI and the Tobacco Working Group were

trying to develop inhalation models, but Lorillard was as well. This was another activity with these animals.

We did do some longer term inhalation and some skin painting studies in our laboratory, but decided that we really didn't have the quality of laboratory that could keep animals free of pathogens for sufficiently long periods, that this was not in our best interests to try to do these studies in our laboratories, and for the most part we've contracted them out to laboratories that are equipped to keep animals in sterile environments and avoid diseases during the course of the studies.

Q. Are those laboratories in the United States that you contracted this work out to?

A. Mostly. I think we've used one in England on

one occasion, but mostly in the United States.

Q. Dr. Spears, given your 40 years at Lorillard, let me ask you this. Has Lorillard ever been party to any agreement with any other cigarette manufacturer in the United States not to do animal testing in its laboratories in the United States?

A. No. We've never been a party to any such

agreement, and we have always done laboratory testing in our lab, where our lab was appropriate for that kind of work.

Q. Based on your 40 years in the industry, Dr. Spears, have you ever even heard of such an agreement?

A. No, I have not.

Q. Let me also ask you whether Lorillard has ever been party to any agreement with any other cigarette manufacturer in the United States not to use commercial cigarettes in its testing program?

A. Not to my knowledge. We use commercial cigarettes and our competitors' cigarettes in various tests.

Q. Have you ever heard of such an agreement in existence between any manufacturers of cigarettes in the United States?

A. No, I have not.

Q. Let me cover one last subject with you. And let me put this board up here. It's the last item on the board. The last item we have up on the board about Lorillard research is additives testing program.

Has Lorillard carried out research to

determine whether any of the flavors or other ingredients that it adds to its cigarettes present any potential health risks?

A. Yes, we have.

Q. Tell the jury first, what is the purpose of adding ingredients to cigarettes?

A. Well, there's several. I put them in several categories. One is what are called processing aids, and these are some simple materials, like water. We add water at various stages and remove it in other stages. We use carbon dioxide to expand tobacco. Although, after the expansion, there's no residual carbon dioxide.

These are typical processing aids that one could consider under the additives.

There's another group that I would refer to as humectants, and these are basically agents that help retain water or moisture in the tobacco, at a given environmental condition. And they accomplish two things: they allow you to process the tobacco without

breaking it all to pieces by making it more pliable. They also provide a benefit in the marketplace, in that they retain moisture in the tobacco; and tobacco with

some moisture in it is more acceptable smoking material than that which is dried out. So the humectants play that role, as well.

Typical humectants are things like glycerin and propylene glycol, used by Lorillard.

Another category I would call are things that distinguish one brand from another. They are the flavor ingredients. Some of the main ones are certain sugars derived from various sources. Honey might be one.

Some of the -- sucrose or inverted sucrose -- inverted sucrose, which is glucose and fructose, again, are used as syrups in the production of cigarettes.

And then there are the minor flavorants that are in tobacco that provide the aroma and nuances between the different brands of cigarettes in the marketplace and are thought to provide competitive advantages for one type or distinctiveness for one type of cigarette versus another, commercial cigarette.

Q. What type of testing has Lorillard done on these various types of additives?

A. We have carried out a battery of tests that

start with short-term, relatively inexpensive tests, and these include such things as general toxicity, measure of irritation, a measure of mutagenesis, and that relates to whether or not a chemical has the possibility of altering the gene, the genome, conceivably leading to disease, particularly cancer, as one.

We carry out a number of these kinds of assays, specifically one called mouse lymphoma; another one called the Ames mutagenic assay, which involves the use of bacteria.

We have carried out one called sister chromezide exchange, which is another one that determines whether you -- whether the agent will break a chromosome, again leading to mutagenic events.

If anything fails or causes an activity in these, we drop it from further consideration, in terms of any additive that we would use.

I should have started out that we would review the general literature on these additives as well; and if there was anything negative about them in the literature, we would drop consideration, as well.

We also do things like immuno competence. Do they affect the immune system? affect

We carry out skin painting studies, and we carry out inhalation studies. On all of the additives that we've used, they've been through all of these screens, the screening activity and testing program.

And the final work in the mouse skin painting and the inhalation work naturally uses a commercial recipe, not just one ingredient at a time, but the whole commercial recipe, incorporated a number of times in higher amounts than we would use commercially. So it's a comprehensive testing program that relates to the safety or acceptable -- acceptability for use of these additives in the cigarette.

Q. How many ingredients have you tested using inhalation studies?

A. About 200.

Q. And does that constitute all of the ingredients that Lorillard presently uses in the cigarettes that it sells to the American public?

A. Yes, it does.

Actually, we have tested more than 200, but there are about 200 that we use that we've tested.

Q. Has Lorillard published in open literature the results of its additive testing program?

A. Yes. We have published most of the work that we've done. We've published, I think, all of the

inhalation work. We have published all of the immuno competence of the -- immuno competence-related tests on a whole battery of individual compounds.

So, yes, we have published the major publishable data from these experiments.

Q. When you test the additives, just so we're clear, do you test the additives at levels higher than are actually in your cigarettes?

A. Yes. We test them at, I would say, about five times the level, and there are some exceptions to that. But we go to five to ten times the level.

We don't go to a level where we begin to interfere with the burning properties of the tobacco, in that that would give us a false result. And something like a humectant, which is added commercially at a level of, let's say, two percent, we would not try to test that at, say, ten percent, five times, because we would clearly interfere with the smoking properties of tobacco, the burning properties of the tobacco.

So, with the exception of some of these major additives, we do test them all at highly elevated levels.

Q. And has Lorillard found any harmful effects

in its testing of the additives that it uses in its cigarettes?

A. We have dropped some from consideration as a result of the testing program, but we have not -- there's nothing in terms of a positive result in any that we use.

Q. Dr. Spears, based upon the knowledge that you've told us about today, your 40 years at Lorillard, your personal familiarity with Lorillard's research and development efforts in the areas of smoking and health over that period of time, and your knowledge even of the work that Lorillard did before you got there, has Lorillard Tobacco Company ever acquired any scientific information important to the question of whether cigarette smoking is a cause of human disease that it has kept secret from the government, from the scientific community or from the American public?

A. No. We have shared all of the information that we have with other scientists, either through publication or through direct communication, as in the case of the Tobacco Working Group.

MR. ROSS: Thank you. I have no further

questions for you.

THE COURT: We'll take a lunch break now, since it's 5 after 12:00. Be back here at 1:30, folks.

1:30.

(The jury exited the courtroom.)

THE COURT: All right. Doctor, the same rules apply over the lunch break. You cannot discuss your testimony with anybody, including the lawyers. Any other topic is fair game.

THE WITNESS: All right.

THE COURT: Mr. Moss, do you want to take up that issue now?

MR. MOSS: Yes. We can do it now or we can do it when we come back. It's your preference.

THE COURT: Let's take it up now.

MR. MOSS: Our team says: Let's do it when we come back.

THE COURT: I want to do it now.

MR. MOSS: Then we'll do it now.

THE COURT: That's what I like.

MR. MOSS: Judge, what I want to discuss for a few minutes with you -- and I can do it from here -- what I consider to be yesterday's improper use by plaintiffs' counsel, over our objection, of the JAMA

article that we discussed at length at a number of sidebars.

I don't have -- I've got the article, but I don't have the -- I think it was Exhibit 5395. And if I'm wrong, somebody in the back will tell me, but I think -- just so the record is clear, that's the

document we're speaking of.

This is an article, the one entitled Prying Open the Door of the Tobacco Industry, Secrets About Nicotine, that appeared in October 1998 issue of JAMA, Journal of American Medical Association.

It's an article that was not new to the parties to this case, nor, respectfully, to the Court. It's an article that we spoke with the Court about early in the beginning of this case; and when we had that conversation, Your Honor indicated that you were familiar with it from the previous case, from Broin, because we dealt with it in Broin.

And the way this article got dealt with kind of initially in Broin, and then again in this case, in the early stages, was in tandem with another piece of information, in this case, a book called The Cigarette

Papers. The Cigarette Papers and the -- that JAMA article got dealt with together, because they were basically -- and I think the Court -- and I can cite Your Honor the transcripts where Your Honor said: Yes, I'm familiar with those, and you characterized those as not being scientific pieces, but opinion pieces or advocacy pieces.

And I think yesterday I tried to demonstrate to Your Honor -- and indeed, that's what this article

in JAMA was, this 5395. It basically was an article by two people, Drs. Hurt and Robertson, that kind of detailed the Minnesota trial experience. And they say it's dealing with their key proposals for legislation with regard to the tobacco industry. And then, of course, I gave Your Honor -- I cited to Your Honor yesterday the conclusions of the article which dealt with how settlements with the tobacco industry by Attorneys General and governments ought to be structured and what concessions ought to be made, and as importantly, what concessions in their opinion are not to be made.

So that's basically the tenor of the article.

Now, we had objected to the use of the

article, and until now, that article basically was off bounds.

What Your Honor then said yesterday was: Well, the article mentions a lot of documents, tobacco documents, which it does, Your Honor. And we then said: We're not complaining about the use of tobacco documents, as long as the document is in evidence or they lay the proper use for it.

But what we are objecting to is basically using this article -- what this article was used for yesterday was the classic conduit -- it's a hearsay

piece, and this -- the examination by Mr. Rosenblatt was basically used as a conduit to get in hearsay information that is not admissible. The underlying documents could have been used, and in some cases, Mr. Rosenblatt quoted from the underlying documents -- it doesn't matter where he quotes it from -- and asked the witness questions about that. That, I really had no problem with.

But there were -- much of the examination involved Mr. Rosenblatt simply reading into evidence portions of this article that dealt with the opinion and interpretations of the writers as to certain

documents. And many of those times Mr. Rosenblatt simply read it into evidence and basically asked: Well, did I read that right, as opposed to a question.

Now, there were some that he asked: Well, do you agree or disagree with that? And, of course, Dr. Dixon gave his opinion, and in most cases said he disagreed and explained rather well what his disagreement was, why he had a different conclusion.

But as to the others, when they simply read what was in the article and the inadmissible conclusions or interpretations of the authors, we have a significant problem with that procedure. We think it was improper, and we think that the Court's ruling on

that ought to be revisited, and there ought to be an instruction from the Court to this jury, which I think we need to sit down and somehow articulate that that was an improper document to this jury to consider, and that where the opinions of the authors were given, the jury is instructed to disregard that because, Your Honor, I just think the law is quite clear, this was an entirely improper use of a document that is inadmissible.

THE COURT: Okay.

MS. ROSENBLATT: Your Honor --

MR. HEIM: Your Honor, before plaintiffs' counsel goes, could I make a couple of points about this, and then I'm sure counsel will want to respond.

Judge, I was concerned about this yesterday, and as a result, I asked that we prepare a very short legal memo on this point; and it ought to be here in about five minutes, and I'll hand it up to Your Honor when it comes.

I ask that it be no longer than two pages, but my guess is it will be three.

But in any event, here is my concern, among other things about what happened yesterday.

First, Judge, these authors are not authoritative on the subject of interpreting documents.

They are not. They have a specialized field. One is an engineer. One is a nicotine addiction guy. But they're not authoritative on how to interpret documents.

Yet, this article is riddled with their own interpretation on documents. So, that's the first point I would make.

JAMA, as the witness said, is authoritative

for articles dealing with medicine, articles dealing with science. This is not an article dealing with medicine or science. So, it is not authoritative on the subject of how to interpret documents in litigation. And, yet, that's what happened.

Third, if you look at that article, Your Honor, what you'll see is that even where they quote documents, they quote them with ellipses in the middle of them, dot dot dot, another little phrase, dot dot dot, another little phrase.

So, the witness isn't being asked about what the sentence or the paragraph really says. He's being asked about what these authors wanted to put in that article. And time after time, you will see in that article, when they quote from -- when they actually quote from documents, you will see where they have little ellipses. Take the very first one on Page 1174.

You can see little ellipses in the middle.

And if I read that footnote correctly, they seem to be citing a newspaper article which reports on this document, although I must confess I have a hard time reading the numbers, the footnote numbers after that. But it looked to me like that was it. It looked

to me like that was a 16. I'll try to look a little closer. And if it is a 16, footnote 16 refers to the same Pioneer Press.

So, in every one that I could find or almost every one, if not every one, had ellipses in them. Not every one, but almost every one. So you're not -- the witness isn't really seeing the document.

Now, that presents another problem for the opposing counsel because, as Your Honor knows, and Your Honor has given counsel an opportunity every once in awhile, either plaintiffs' counsel or defense counsel, has stood up and said: Your Honor, under the rule of completeness, would he read the next sentence or next paragraph? You can't do that here. You don't know what to read. You have to try to figure out what's missing.

So, you have that issue with it, as well, including, you know, the hearsay within hearsay. So this document, admittedly, it says what it is; it's an

advocacy piece, drawing conclusions about documents by two people who were witnesses in the Minnesota trial, who got it published in JAMA, and it is not an

appropriate article under the law for cross examining a witness with.

There may be documents that either may or may not be appropriate for cross examining a witness with that are referred to in here, but this article and the way it presents in the documents is not.

And my concern with it is the ongoing aspect of it; that is, if this starts to be used in a way to cross examine witnesses as we go on, I think it would be very, very prejudicial to do that on a going-forward basis. I thought Dr. Dixon dealt with it as well as he could, but I was concerned about it last night, and that's why I asked about it -- that a memo be prepared, and I will present it to Your Honor.

But I urge Your Honor that, for lots of reasons, this is not an appropriate document for cross examination, under the rule.

MR. SCHNEIDER: Just two additional pieces of information, Your Honor, before plaintiff responds.

First, this article is dated October 7, 1998, so it actually came out after the Broin case. In the Broin case, we dealt with The Cigarette Papers and a

set of JAMA articles at that time that were similar. Your Honor did not allow them into evidence.

This was written after the Broin trial, October 7, 1998, by two witness from the Minnesota trial.

Most interestingly, one of the reasons the plaintiffs said to Your Honor that they wanted to use the document earlier, in October, was because one of the authors, Richard Hurt, couldn't come to testify, so what a classic end-run, to read snippets of his views to this jury when he couldn't be cross examined here.

Finally, two additional points. We objected on the basis of the best evidence rule as well since the documents weren't introduced.

The final point, Your Honor, is on two occasions, the witness tried to tell Mr. Rosenblatt, and was cut off because Your Honor didn't want to discuss the topic, that there was a problem with the article, that he -- that he did not regard the article as a proper article. He was never given the article and asked the direct question: Is this document authoritative? It was a leading question on that topic, to which the objection was sustained, but he tried to tell the Court and the plaintiffs' counsel that that article was not anything near a scientific

authoritative article.

THE COURT: Okay.

MS. ROSENBLATT: Okay. Very briefly.

Initially, the history given, and to some extent Doc cleared that up by Mr. Moss as inaccurate, this was not something that came up in Broin, because, as Doc explained, this was something -- an article that just came out in October of '98. So this was not -- certainly not an article that Your Honor had excluded or said that this was some type of emotional piece that was not a medical article.

When it came up earlier in the case, Your Honor, you know, we debated it at sidebar, in terms of trying to admit it as an exhibit through Dr. Benowitz' testimony. And Your Honor had said: Well, that would be bolstering the testimony. And I had mentioned all of the exhibits that the defense had listed, and basically it is an analysis of the information contained there about what has happened and various documents that are contained within the files that the defense has.

And this is cross examination. This witness came up and purported to have reviewed thousands of articles and thousands of documents from BAT, and also

25 gave his opinions on the literature and the information

1 in the public domain, and here is someone who is
2 clearly far more authoritative, Dr. Hurt and
3 Dr. Robertson, that had done this peer-reviewed article
4 for JAMA. We're simply using it for appropriate cross
5 examination.
6 And the article did have information on
7 compensation, contrary to opinions that he had
8 rendered, and most of what we presented was simply
9 excerpts from various documents. They had an
10 opportunity if they wanted to address those documents,
11 but those are documents they vehemently object to even
12 being involved in the case. So they can't have it both
13 ways.
14 I mean, this is something we're permitted to
15 use under the law. The witness recognized the authors
16 as authoritative, the journal as authoritative. It's a
17 peer-reviewed article. It appears in JAMA. We're
18 allowed to cross examine.
19 THE COURT: What I'd like to do, I'll wait to
20 get your memo. I'd like to get Mr. Rosenblatt to

take

this copy here, the one I have, and just outline -- I think you had yours in yellow, I think.

MS. ROSENBLATT: Then he skipped quite a bit of that.

THE COURT: So outline on this copy, which is

a clean copy, what you actually read. Okay? And then I'll be able to review it.

MR. ROSENBLATT: Okay. Sure.

MS. ROSENBLATT: Sure.

THE COURT: I know you did skip.

MR. ROSENBLATT: Oh, yes. Right. Because there was a sidebar, and you made a distinction.

THE COURT: I'll look at your memo, and we'll talk about it some more.

MR. ROSENBLATT: You made a distinction between what the authors were saying and what the document said; and as a result of that, I changed my question.

MR. KIRBY: Your Honor, I'd like to make one comment to clarify the record. There is no evidence on this record that this article is peer-reviewed.

THE COURT: We heard that.

(A lunch recess was taken at 12:30 p.m.)